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OF THE CARDIAC PATIENT IN INDUSTRY

By Harold N. Segall, M.D., F.A.C.P.

The physician occupies the post of leader and co-ordinator in appraising the fitness for work and the selection of a suitable job in rehabilitating the cardiac patient. To estimate the prognosis for duration of life itself, for duration of life as a gainful worker and the probable frequency and duration of absences from work, the physician requires his usual medical diagnostic guides and also advice from the social service worker or a suitable equivalent, and from a job analyst or a suitable equivalent. The co-operation of the employer and of fellow employees may determine the ultimate success or failure of the plan for rehabilitation however reasonable, logical and promising it may be. My own experience has been that in most instances the physician has functioned to determine the diagnosis which governed the estimate of prognosis; then the physician functioned as the equivalent of the social service worker, of the job analyst and of the social science advocate to enlist the co-operation of employer and employees.

In the light of present day methods of measuring fitness for work, only very broad general principles can be applied both to the individual case and the large group as well. The task of deciding whether the individual is fit for some form of work and then determining the nature of the work he should do requires that each case be treated separately. One diagnostic label may describe the pathological lesion in a score of individuals yet each of these may belong to a different category with respect to fitness for work. Assessment of the degree of impairment of cardiac function and measurement of productive capacity of an individual requires recognition of the various degrees of abnormality represented by a particular diagnostic label.

* Paper presented at the annual meeting of the Industrial Medical Association of the Province of Quebec, Quebec City, October 1953.

Congenital Heart Disease

Obvious signs of congenital cardiac anomalies come to our attention at the pre-employment medical examination. The industrial physician may have the privilege of being the first to recognize patent ductus arteriosus, coarctation of the aorta, or uncomplicated pulmonary stenosis, conditions which can be corrected by surgical operations which now involve very little risk and result in prolongation of life itself and of the worker's productive capacity. These people should be guided towards surgical therapy. In most instances the operation should be performed before the individual is assigned to a job. However when circumstances do not permit this course, suitable employment should be given and the operation should be performed within a reasonable period of time, measured in terms of months and not in years. A case of this kind came to our attention in January of 1949. A boy of 18 applied for employment in a large retail firm; the industrial physician found the blood pressure too high for his age and rejected him. This was the first time his blood pressure had been measured. He had undergone a number of medical eaxminations including those at school and was invariably pronounced as normal. He then sought employment as a clerk in the Canadian National Railways and was examined by Dr. Peter Vaughn who heard a loud aortic systolic murmur and finding the blood pressure in the arms 170 systolic and 100 diastolic, measured the blood pressure in the lower extremities; he could not hear any sounds over the popliteal arteries; X-Ray examination of the chest revealed the notching of rib margins which confirmed the diagnosis of coarctation of the aorta. We advised and convinced the boy and his mother to have the operation performed and it was done six months later by Dr. Dudley Ross. The boy made an uneventful recovery and then applied for the job in the large retail

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firm whose physician had rejected him. He obtained the job he wanted. On this occasion the blood pressure was about 130 systolic and 80 diastolic. I saw him six months later and he declared he felt no different as a result of the operation. He had not had any symptoms which might limit his activities in sports or at work before the operation and remained equally well, no better, after the operation. He was and is very fortunate. Our examination before the operation revealed not only hypertension in the arms, but also a loud, long coarse systolic murmur, loudest over the aortic area. If this murmur had not been ignored by at least one of the physicians who examined him in early youth he might have had limitations forcibly imposed on him and we may now judge that these restrictions would really have been unjustified. Now he is free from the possibililty of developing those disabilities which result for caorctation of the aorta and can pass medical examinations for employment or for life insurance without any difficulty.

A loud systolic murmur may represent one of the congenital anomalies for which no surgical operation has yet been devised successfully. For auricular septal defects operations which promise to become established have been performed, but ventricular septal defects remain a challenge to the surgeon. Uncomplicated septal defects do not impair cardiac function significantly. The principal source of danger is that acute or sub-acute bacterial endocarditis may develop on the margin of the defect. Fortunately we now live in the era of antibiotics; we can both prevent and cure such endocarditis in about 90% of cases if the condition is recognized and treated early. Thus people with congenital cardiac anomalies and without cyanosis should not be rejected at the pre-employment examination. They should be guided into jobs that do not require heavy physical exertion. As yet we do not know enough about these conditions to be sure that persons thus afflicted could engage in heavy work for as long as a normal person.

People with congenital cardiac anomalies who show evidence of cyanosis suffer from disability to a degree which makes them unfit for ordinary conditions of employment. They require liberal, sympathetic consideration. Under suitable circumstances they can be productive workers who, incidentally, serve to raise the morale of their healthy co-workers. In 1930 I began to attend a girl of sixteen who had been a blue baby and presented the signs of tetralogy of Fallot. She was considerably disabled by shortness of breath and fatigue but was able to work as a saleslady until she married at the age of 21. Her husband did the heavier house work and they managed quite well until he became interested in another girl several years later. In this unhappy state, in 1944 she resolved to do her bit of war work to honour the memory of her father who was killed in action in World War 1. She painted her blue fingernails red and applied lipstick to camouflage her blue lips. Thus she passed the pre-employment medical examination in a defence plant. She reported this to me after she had been engaged in the assembly of an electrical gadget in an aeroplane factory for six months. She devoted all her non-working time to rest and felt quite well during these six months, as well as when she had not been working. Four years later she became almost totally disabled and at her insistence the Blalock-Taussing operation was performed although because of her age (about 35) she was a very bad surgical risk. She died 24 hours after the operation as a result of haemorrhage from the site of arterial anastomosis. The story of this young woman exemplifies the significance of motivation in rehabilitation of the cardiac in industry.

At present, I am attending a man of about 39, who was found to have heart disease at birth. He began to have cyanosis at 15. He had to walk slower than other children and could not run as a boy but he had normal schooling and became a mechanic in an aeroplane factory. In 1939 he fled from the Germans when they invaded his native Poland. He marched many miles and made his way through Roumania, Yugoslavia, France, Spain to Portugal whence he came to Canada in 1942. Here he worked in a machine shop occasionally lifting as much as 50 pounds. But in the summer of 1952 he began to have more dyspnoea than usual and oedema of the legs. This brought him to me. He probably has an Eisenmenger syndrome and thus cannot be helped by surgery. He is now totally disabled. His story also shows the range of capacity for exertion which a person with cyanotic type of congenital heart disease can endure if properly motivated. In these individuals the fitness for work cannot be deduced from the diagnosis alone; it must be determined in terms of the person's performance at work. Would he have fared better if he had lived a more protected life? This reasonable question cannot be answered categorically. This man would have been extremely unhappy if he had

not worked at a regular job. He would not have obeyed any doctor who might have advised him to avoid work. He has no regets. The fullness of a life is not to be measured by its length alone. This view plays a significant role in my calculations as I assess a patient's fitness for work and play. To the estimate of the degree of physical disability must be added an appraisal of the individual's motivation. An obstinate anxiety neurosis leads the patient along a path of life that may perhaps be longer but rather barren and joyless. I need not describe cases of this kind because you are all familiar with them; they occur with and without organic disease.

Rheumatic Heart Disease

Rheumatic fever and rheumatic heart disease occur at all ages but most frequently before the age of 20. Recurrences of rheumatic fever call for long absences from work, lasting three to six months or longer. The life expectancy of those who develop tight mitral stenosis may now be increased by commissurotomy and the surgeons are developing techniques for the treatment of aortic stenosis. These favourable features however affect only a portion of the whole problem of rheumatic heart disease from the point of view of appraising fitness for work. It is useful to know that rheumatic fever occurs rarely after the age of 20 and even more rarely after 25. The precise pattern of heart sounds and murmurs correlated with fluoroscopic study of the chest and the electrocardiogram provides evidence for an accurate estimate of the degree of valvular and myocardial disease. Thus the diagnostic label can be qualified. To state that there is mitral stenosis in not enough. The degree of stenosis must also be stated and this is true of mitral insufficiency or aortic insufficieny and stenosis. Small degrees of valvular deformity do not significantly impair the capacity for work or shorten the duration of life. Young people with marked button hole type of mitral stenosis are frequently unaware of any disability until they reach the early thirties. Respiratory infections which may reactivate arrested rheumatic lesions are the greatest source of danger to these patients. All cases of rheumatic valvular disease share the common danger of developing sub-acute or acute bacterial endocarditis. They should know that antibiotics such as Penicillin administered during an infection or a surgical operation as minor as a tooth extraction, are effective in preventing the development of sub-acute or acute bacterial andocarditis. The appearance of fever should invariably lead to a search for signs of this disease and in some instances thorough treatment should be administered even if blood cultures are sterile. These measures save lives and reduce the duration of absenteeism from work.

The story of a railway office clerk who died at the age of 56 will show how the problems of rehabilitation

may be met in a case of aortic stenosis of marked degree with moderate degree of aortic insufficiency and mitral stenosis. He was born in Montreal in 1895 and had scarlet fever at the age of two years. He recalled no other illness when I first saw him at the age of 44. However, he served in a Canadian Infantry Regiment from 1915-1918. In the winter of 1918, after a leave in England, he was about to return to France and was examined by a medical officer. On this occasion heart disease was found which led to his being returned to Canada and discharged from the Army. He probably developed this valvular disease after scarlet fever and before the age of 15. He returned to work as a clerk and remained in good health until one night in 1920 when he was awakened from sleep at 4.a.m. by severe pain in the front of the chest. This pain lasted half an hour. His family physician diagnosed heart disease and although no fever was present and there was no recurrence of pain, the treatment consisted of eight months of rest in bed. I did not dare enquire further why he had been in bed so long but I admired him as a man because he showed no trace of cardiac neurosis which usually results from such therapy. When I first saw him in 1939 he reported that he had developed a cold three days previously, and during this time he had spells of tightness in the front of the chest both while at rest and during exertion, each lasted about half an hour. The

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signs of aortic and mitral valve disease mentioned above were found and the heart was about double the size of a normal heart. A week of rest on a convalescent regime and observation of temperature as well as nitroglycerine for the relief of the pain were prescribed. At the end of this time he reported that he had no fever and as the cold disappeared the pain ceased to recur. He then returned to work after a second week of convalescence. During the next nine years he worked regularly. About once a year he had a cold which caused him to remain at home for a few days, but there was no recurrence of pain. In the winter of 1948 he had influenza; following this illness his general strength was diminished and he was treated and spent his convalesence in a military hospital. During that year he had low grade rheumatic fever and spent about two months in the military hospital. Then his general strength became so impaired that he was totally disabled before signs of congestive cardiac failure developed. He died two years after he stopped working. Thus he had worked effectively from about the age of 15 to 54 and also served in the Canadian Infantry from the age of 20-23. He wisely chose the work of a clerk. He was unfortunate in his susceptibility to respiratory infection, or he might have worked until his early sixties. Should we today reject a youth of 15 who seeks a job, because he has such rheumatic heart disease? In my opinion this typical story calls for advising this youth to take a job which does not involve heavy work or exposure to bad weather and to encourage him to live a full life practicing moderation both at work and at play. If this policy is justified in a case of rather severe rheumatic heart disease it certainly applies to those who have only moderate or slight degree of this disease.

Thyrotoxic Heart Disease

The industrial physician who attends many middle aged women will quite frequently enjoy the clinical satisfaction of detecting so-called masked hyperthyroidism by the symptoms and signs of impairment in cardiac function. Auricular fibrillation in the absence of mitral stenosis in a woman of 50 or over justifies strong suspicion of thyrotoxicosis. Early detection and treatment of this condition will extend the life of the patient and greatly reduce time lost from work because of illness. This condition occurs less commonly in men than in women. Usually when the diagnosis is made the patient has already lost considerable time from work because of a sense of exhaustion even after a night of rest, shortness of breath, palpitation and nervous tension. The physician finds auricular fibrillation and signs of congestive cardiac failure, tremor of the extended fingers and tongue and probably one or more small nodules in a thyroid gland which at first glance seems normal in size. The younger the patient and the earlier in the course of illness that treatment is applied, the greater the degree of rehabilitation.

Syphilitic Heart Disease

Statistical studies of the duration of life in cases of syphilitic heart disease have provided us with reliable guidance in estimating the prognosis in cases of syphilitic aortic insufficiency. This diagnostic label must be qualified by determining the degree of insufficiency, which can be estimated from the loudness and duration of the diastolic murmur, and the pulse pressure and from the size of the heart. A relatively short and faint murmur does represent syphilitic aortic insufficiency, but in such a case a normal blood pressure and pulse pressure and normal size of heart indicate that the degree of mechanical disturbance is too slight to impair cardiac function. In a middle aged man, this usually remains unchanged for the remainder of his life. In somewhat younger men, the possibility of progressive increase in degree of aortic insufficiency, in spite of therapy, must be considered. The fact of greatest significance is that however severe the degree of organic disease, the patient enjoys good health and strength for years even as long as two decades before he begins to experience symptoms of congestive cardiac insufficiency, usually left ventricular, and then his health deteriorates rapidly to the end of his life in a period which may be measured in terms of months rather than years. We have

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yet to learn whether Penicillin therapy will significantly alter these concepts of prognosis which were derived from studies made in 1932 and subsequently confirmed.

Hypertension

The most common and the least understood form of cardiovascular disease is that related to hypertension. Occasionally a specific cause such as pheochromocytoma or a Goldblatt syndrome kidney may be treated surgically. In more than 95% of cases we deal with essential hypertension. The signals which guide in differentiating various degrees of illness for estimating prognosis are not yet sharply defined. However, there is some justification for separating those who show no objective evidence of cardiac, renal or cerebral disease and in considering them as mild cases with the better prognosis. Then among the remainder there are those who are already disabled and those who are only partially disabled. In this third group we find the people who might benefit most from surgical treatment with sympathectomy. In the first group there are men and women who will eventually enter the other two groups and there are others who will live to the seventies and eighties and have no more disability than people with normal blood pressure. One guide which tends to distinguish between these two types is the diastolic pressure; those with levels of 120 mm. or more are good candidates for the development of significant cardiovascular disease. Systolic hypertension with normal diastolic blood pressure is relatively insignificant. About twenty years ago Dr. A. E. Gilchrist of the Canadian National Railways clinic, made a survey of the blood pressure in locomotive engineers and firemen. From this study we learned to abandon the life insurance limits of normal, 140 systolic and 90 diastolic, and raised the normal systolic to the vicinity of 170 systolic and the diastolic to the vicinity of 110 for middle aged men. This was and is important to the men and company. If the lower levels had not been raised a very large number of men would have been retired unnecessarily and prematurely. In the absence of knowledge about the specific cause and control of essential hypertension we must rely on good judgement in dealing with each case; to me this means, among other things, to avoid being guided by inspired preconceived notions in the routine management of these people. There is one exception however; I would approve of inspired optimism in viewing prognosis. Those cases which show no evidence of disease in the heart, brain or kidneys, should be allowed to continue at their usual occupations. The remainder should be managed according to the degree of disability. Those with a high diastolic pressure should be steered away from heavy or hazardous jobs. I recently had the unhappy experience of strongly recommending that a civil air pilot of more than 20 years standing should be permanently "grounded" at the age of 44, because of a fixed diastolic and systolic essential hypertension.

Coronary Heart Disease

Coronary artery disease usually strikes the middle aged man, often an employee of many years service who has identified his emotional life with the interests of the company. It is common knowledge that such an illness requires about six weeks of rest and then several weeks of convalescence. This makes for much inconvenience to the patient and the company, but usually both are considerate and co-operative. Presently, if not on the very first day of the illness, the physician faces the question from the patient, "Will I be able to go back to work?" and from the company "How much will he be able to do after the 8 or 10 weeks are over?" Very early in my career as a practising physician I learned that the most potent medication a physician could give such a patient when he first sees him is to declare that after the usual period of rest he will return to his usual job. Nothing is more effective in relieving anxiety and in preventing cardiac neurosis. This statement is good medication at any stage of the illness. The response of the

patient almost invariably consists of gratefulness for the good news. In some, fortunately a minority, reflection produces doubts, anxiety and fears which partially or wholly disable him as a gainful worker. The majority enjoy the great pleasure of returning to work on a part time schedule for the first few weeks and then on full time. When asked about recurrences of coronary artery disease, the wise physician clearly declares that no satisfactory methods of prevention are known at present. The patient's situation remains essentially the same as that of any man of his age; no one can predict who will and who will not have this illness one or more times. The patient must settle down with the well-known philosophy, work and play well each day and don't bother about tomorrow. At this point motivation plays a dominant role in the progress of the patient. To some extent this can be seen in the statistical analysis of a group of 178 cases who survived one or more attacks of acute coronary artery disease with myocardial infarction. These patients were observed by me from 1926-1939. The

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largest proportion, 73%, returned to work in the age group of 40-49. At this age the responsibilities of a growing family and a progressive career tend to encourage optimism and good motivation for returning to work. In the older age groups the reduction of urgent responsibilities makes for rationalization of the decision to retire from work. Masters and his associates performed the laborious task of analyzing the circumstances under which over eight hundred attacks of acute coronary artery disease occurred and found that only about 2% developed during heavy work; in the majority of cases the attack began when the patient was at rest. We can feel secure in stating that there is little if any direct relation between work and the cause of coronary artery occlusion. This helps to assure the patient, his employer and fellow employees that work will do no harm. Of course, on general principles, he should be steered away from hazardous or very heavy work. When there is evidence of congestive cardiac insufficiency or frequent recurrence of cardiac pain at rest as well as on walking outdoors, the worker must be considered as temporarily and probably totally disabled. However, I would like to underline the fact that cardiac pain of chronic coronary artery disease, so called angina pectoris, occurs readily after a few minutes of walking outdoors and fails to appear when the man walks indoors. Thus a foreman who spends his whole day walking the length and breadth of a large plant, free from any symptoms, develops cardiac pain as he walks for five minutes or less to and from the streetcar. Such a man is fit to continue his work as a foreman. However, when he begins to develop pain as he walks indoors it usually means an increase in the degree of disease and this must be taken as a signal of possible impending acute coronary artery disease. He should be advised to rest at home for at least two weeks and if pain should recur at rest his status must be interpreted in the light of adequate clinical investigation. If however, he remains free from pain for fourteen consecutive days he may then return to work, on a part time schedule as a test of his fitness. Then if he reverts to his previous state of no pain while walking in the plant, he may continue to work.

The immediate and the ultimate prognosis in a given case of coronary artery disease cannot be measured accurately. An optimistic estimate, I think, is more often right than wrong, and so I continue to make optimistic prognoses and encourage all concerned to have the patient continue at suitable work as long as he shows the capacity to perform his task comfortably. This principle is also applied to cases of congestive cardiac insufficiency who are controlled with Digitalis and mercurial diuretics. At present the duration of life after the onset of congestive cardiac insufficiency is being greatly prolonged by the use of mercurial diuretics. Patients who might have lived only one or two years twenty-five years ago, now live ten or more years after the onset of pulmonary or peripheral oedema or both. The therapy

is so effective that they are fit for light work during these years. Given good motivation, they do lead wholesome, useful lives in spite of gross signs of quite severe heart disease.

At this point, I would like to mention a person of high courage and good sense who taught me much about the subject of rehabilitation. On May 9th, 1949, I wrote the following clinical note about him; "Mr. T. is a wonderful example of what persistence, courage and good stamina can perform. Other people with the degree of illness that he has would be almost bed-ridden. He is doing a full day's work; true, rather light work in an atmosphere of generous people, but he does go to work every day in all kinds of weather and has the feeling of a man who is supporting himself." He first came to my attention in July of 1944 when he was 62 years old and a locomotive engineer. The clinical history indicated that he had had acute coronary artery disease with myocardial infarction seven weeks before; the treatment consisted of a week of rest at home and three weeks holiday at his son's house in Nothern Ontario. He had had coronary cardiac pain on walking outdoors for two years until the acute coronary artery attack. After the attack there had been no recurrence of pain while walking. He wanted to return to his job and was referred to me for appraisal of his fitness for work. I found evidence of healed ventricular anterior wall infarct, paroxysmal left bundle branch block and moderate

hypertension (180/110) but no signs of congestive cardiac insufficiency. I recommended light non-hazardous work and he was placed as second man on a Diesel engine. He worked regularly on this job for about a year until he was retired on pension which was too small for the modest needs of Mr. and Mrs. T. He sought and found a light job as a timekeeper in an industry situated 200 miles north of North Bay. Two years after retirement his main symptom was dyspnoea on walking or hurried exertion and he changed his job to one in Montreal as stock room attendant, in a large office. Here he was treated with special consideration by his boss who had recently returned to work after a so-called "heart attack". Thus he worked for three years, in spite of moderate discomfort but in the next three years of his life, he was disabled completely for periods of weeks or months by recurrences of acute left ventricular insufficiency with pulmonary oedema, by cerebral vascular disease resulting in transitory paresis of an arm and leg and permanent hemianopsia. During two of these three years, he worked in the intervals between acute illnesses. In the final year, he was almost totally disabled by right ventricular insufficiency which was controlled partially with digitalis and mercurial diuretics. Even during this last year of relatively severe illness he helped to earn some money by attending to the furnace and doing housework as he and his wife who was also sick, rented some rooms of their house to boarders. The story of this man exemplifies what a courageous, willing man achieved in adjusting himself to a wide variety of severe disabilities related to arteriosclerosis and hypertension. He did some form of work whenever he was not totally disabled. This man, who in his youth served his native country as a sailor on the Battleship "Maine" in the Spanish-American War, lived gallantly, beyond the call of duty as a worker, at the end of his life. His pension should have been adequate for the needs of Mr. and Mrs. T. Industry, insurance companies and the public represented by government must take a more realistic attitude towards men and women in the age group of over 60. Physiological age and not chronological age should determine the time of complete retirement from work and then the pension should not be as obviously inadequate as it frequently is at present.

Iatrogenic Heart Disease

The family physician may have an emotional storm when he is consulted by a person who was rejected as an applicant for employment because the medical examination revealed a heart condition. The usual report is that the doctor said that there was "a murmur" or "high blood pressure" or "a leaky valve" or "enlarged heart". And in some instances the person began to notice palpitation since learning about his heart condition. The emotional storm develops when the family physician finds no evidence of disease and is faced with the problem of treating iatrogenic heart disease. However he must be patient; we are each entitled to an opinion. Moreover, who can define precisely what is normal? There is no specific "normal", there is a "range of normal". With these thoughts in mind the two physicians should discuss the problem and the iatrogenic heart disease will be most effectively cured when it becomes possible for the industrial physician to include his observations with the "range of normal". Having in mind the fact that minor slight deformities of cardiac valves do not impair cardiac function it is safer to err by including a given case as within the "range of normal" than to err by fixing the label of heart disease on a person who has none. This is true also for transient hypertension or arrhythmias.

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REFLECTIONS on Diagnosis and Treatment of Industrial Dermatitis

By Richard Therrien, M.D., Dermatologist

Industrial dermatitis is an important medical problem and, according to many writers it constitutes the greater percentage of industrial diseases, especially if we include dermatoses like acne, cancer or certain types of mycoses. However, this paper will be confined to a discussion of contact dermatitis of industrial origin, namely skin reactions caused by external irritants.

I do not pretend to offer anything new but rather to dwell on some particular aspects of diagnosis and treatment in order to indicate how we may be able to relieve disabled workers in the most effective manner and thus lessen the financial burden imposed on the whole community.

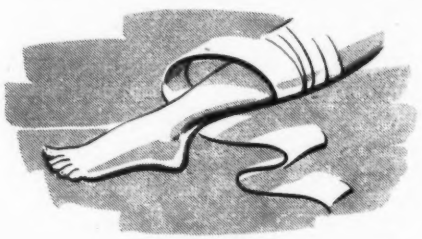
The Role of the Practitioner

Unquestionably the dermatologist, who specializes in this field, is best qualified and equipped to deal with these cases, but the practitioner in his own way may be able to make a valuable contribution. The first consideration is the establishment of a diagnosis based on a thorough case history and clinical investigation before starting any curative treatment. In many instances, untimely treatment, before proper diagnosis has been made, has resulted in further complication and prolongation of the condition.

Diagnostic Procedures

The establishment of a diagnosis should follow a definite procedure. First of all, a precise history of the condition should be obtained from the patient, before the skin is examined at all. After a thorough history has been recorded, the lesions should be examined with respect to their appearance, localization and general pattern. This type of examination may, in some instances, give valuable information for diagnosis.

The following experience will serve to indicate the importance of thorough inspection of irritated skin areas.



One day, during a visit for treatment of an ulcer on her leg, a female patient of mine drew my attention to a rectangular area of irritation which had appeared on the ulcerated leg. Routine questioning did not reveal the cause, but as she was removing the dressings from the ulcer, something dropped to the floor which turned out to be a plastic-covered image of St. Anne which fitted exactly over the irritated area. The irritation disappeared after she discontinued the practice.

Locating the Irritant

Yet, a good diagnosis is not enough! In many cases it may be impossible to determine whether the condition has developed from contacts in the home or at work, unless the sensitizing agent is known, and therefore,

every effort should be made to locate and identify the offending source. If you happen to have a lead, follow it like a detective and if you do not find more clues, do not get discouraged easily. I know that it is tedious for

a busy physician to spend half an hour or more with one patient when the waiting room is overflowing and he has to be on schedule for home or hospital calls, but this will be time well-spent if it reveals the troublesome irritant or even provides a possible lead to identification.

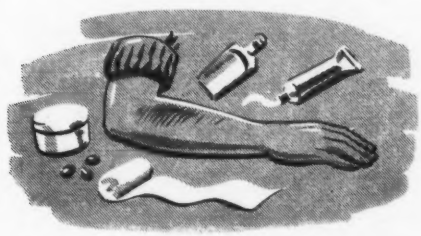
Patch Tests

Sensitizing agents may sometimes be determined by patch-testing but this procedure should be carried out very carefully to be of value and it is not advisable to use patch-tests until some clue to the identity of the irritant has been discovered. Also, reactions to these tests may be negative if the proper technique is not used. A further point of confusion results from the fact that the different areas of the skin vary in sensitivity; a test may be negative when applied at some distance from the site of the irritation, but positive near or on the lesions; and there is a difference in the degree of sensitivity of different individuals.

Another situation encountered is the delayed positive reaction on the patch test, particularly when testing with clothing samples.

Therefore, for best results, it is important to be very cautious and painstaking when making use of patch-tests for identification of skin irritants.

However, this is only a part of the problem. When a sensitizer has been found it should be removed from



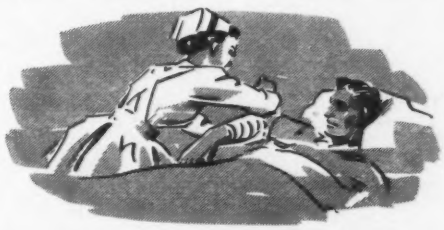
the worker's environment, but in many instances, it will be necessary to treat the patient before the irritating substance has been identified.

Classifications and Treatment of Dermatitis

First, to be brief, we shall divide all cases into two types: Acute or oozing, and chronic or dry. It is quite true that you will encounter sub-acute cases but we are convinced that the physician, who manages the two main classes efficiently, will not have any trouble with such cases.

A dermatitis is classified as acute when oozing is the main feature. Chronic is the term used for a dermatitis which has persisted for a long time, as well as for the type which is not oozing. The skin is much more irritable in the acute stage of dermatitis and that is why treatments are quite different for these two types.

Now I would like to emphasize the chief points to be remembered. It is important that the patient be cured in the shortest possible time and in the most economical manner without harming him in the least. Your instructions for treatment should be well understood, because even after repetition, there are people who will not carry them out correctly. If they are ill enough, my advice is to admit them to hospital as soon as possible, because it is not unusual for a patient to be cured in hospital under the same type of treatment which had been carried out at home without success. This dis-



parity in results is a credit to the better technique of trained personnel and closer supervision by the physician.

It should be remembered too, that the skin possesses a natural power of defence and may heal alone if nothing interferes with recovery, but too often a skin condition progressing satisfactorily with the aid of some ointments, is made more irritable by daily cleaning.

As you can see, treatment is not enough; much skill is also required.

For acute dermatitis the treatment of choice is wet dressings with boric acid or potassium permanganate to stop the weeping, diminish the oedema and allay the pruritis. However, the proper technique must be used to be successful.

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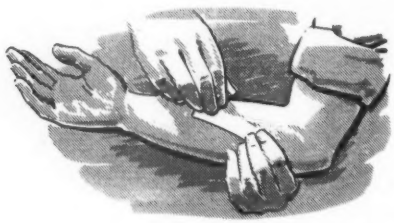
By all means, the patient should be thoroughly familiar with every step to be taken. Tell him to use a clean piece of sheeting, a pillowcase or white shirting, folded two or four ply, for direct application on the skin. Compresses should be of sufficient thickness to remain wet for long periods and absorbent cotton or surgical gauze soaked in the chosen solution are recommended as a second layer. Adhesive tape should not be used on the skin to avoid further sensitization. Furthermore, inform the patient that wet dressings are to be changed at three hour intervals, day and night if necessary.

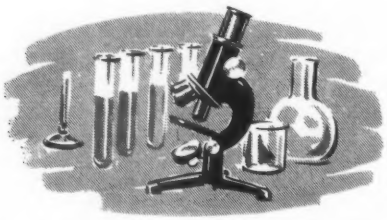
When the skin has dried up, boric acid in petrolatum or zinc or tar ointments should be ordered according to



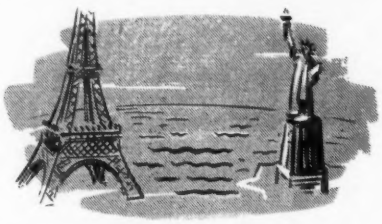
the case and if any special sensitivity is suspected a patch-test should be made with the ointments you have chosen to use before applying any one of them on the whole area of dermatitis.

Ointments, in general, are to be used sparingly and it is much better to know a few of them very well than to employ them all without knowing their ingredients and possibly sensitize the patient to some other chemical agent.

If secondary infection occurs, we have modern weapons to meet this situation, but it is becoming



evident that disease organisms, which used to be completely destroyed in the presence of antibiotics a few years ago are developing greater resistance to their action today. We have all met people with staphylococcus aureus infections which no longer respond to penicillin therapy, whether by injection or local application. In such cases, if a good laboratory is not immediately available, other new antobiotics should be tried, but if the infection does not clear up rapidly, a sensitivity test to antibiotics or the micro-organisms involved should be performed as soon as possible in order to rule out any sensitizing agents and to determine the most effective antibiotic. Do not forget, however, that this test may sometimes be misleading. I have seen quite a few patients who were cured by penicillin despite the fact that their staphylococci were not



effected by penicillin in vitro. Disease organisms have a natural tendency to adapt themselves to their environment and it is therefore a good policy to prescribe the more recent antibiotics for the best results. Furthermore, antibiotics appear to exert a synergistic action if two or more of them are administered simultaneously.

Another important factor is the pruritis which usually varies in severity according to the extent of the dermatitis, the localization and especially the nervous condition of your patient. It is surprising indeed to observe people in this respect. During my post-graduate studies, I was amazed to see the great difference in pruritis between the same dermatoses in France and in the United States where the tempo of life is not the same. People experienced considerably more itching in the United States than in France.

Ordinarily, itchiness is the main symptom of contact-type dermatitis. It can be controlled usually by wet dressing, and antihistaminics but these simple measures often fail and at this stage every known treatment should be used to stop it.

Most of the time patients are told to avoid scratching, but I think this is a mistake because if they do not scratch, the need to do so will cause restlessness and irritability which in themselves may further aggravate the itching. It is better to show them hov to scratch without breaking the skin, a thing that can be done if they do not use their fingernails or do not rub the skin too vigorously and by so doing there is not much danger of a secondary infection.

As you see there is nothing new in all these reflections, but I sincerely feel that many cases of industrial dermatitis will clear up more rapidly if a good diagnosis is made early and if only simple treatment is carried out.

Health & Hygiene IN THE ALUMINUM INDUSTRY*

Mr. J. B. White
Aluminum Company of Canada, Ltd.

The Aluminum Company of Canada takes a keen interest in health matters concerning employees on the job and in the community, but we believe the individual has a very definite role to play in personal and family health. We believe the employee should accept these responsibilities as a mature individual along with the freedom he enjoys.

As an employer we do everything we reasonably can to establish and maintain high standards of industrial hygiene in our plants. Healthy working conditions, proper rest rooms, lunch rooms and locker rooms, organized accident prevention, First Aid and care for the injured, are all factors for which we assume responsibility without question. We conduct pre-employment examinations and periodical re-examination of employees in hazardous and sometimes in non-hazardous occupations. We carry on continuous research and investigation into such things as toxicity of materials handled and of dust, gas and vapours arising out of certain operations. From time to time we co-operate with the Federal, Provincial and local health authorities in any matter which interests them. For several years we have been conducting original research and investigation on physical fatigue. The medical practitioner and the nursing profession are vital to us in these endeavours.

Beyond a line which I would draw as to what we usually call industrial hygiene, we feel the individual should begin to take over from the employer all or a large part of the responsibility for health matters. In assuming such responsibility we believe the individual can maintain health standards more effectively and economically than if "off the job" services are provided by the employer without responsiblity on the individual's part.

*An address given at the meeting of the Quebec Industrial Nursing Association, February 19, 1954.

As an employer we are ready to assist our employees in efforts to organize health services, if they wish to do something about it for themselves. By one means or another we assist them by paying sick benefits in order to assure income for employees unable to work because of accident or illness. We have what we think is one of the best Life Assurance and Pension Plans to be found anywhere. We contribute to community projects such as hospitals and to public health services. If our employees wish health or hospital insurance such as is furnished by Blue Cross or other group insurers, we permit payroll deductions, but we are guided in these matters by the principle that the responsibility is best lodged in the hands of the employee—not with the employer.

As you may know, our company conducts a multi-plant type of operation. We operate plants of various sizes in different locations throughout Canada such as Arvida, (Figure 1), Isle Maligne, Shawinigan Falls, Beauharnois and Wakefield in Quebec. In Ontario we have plants located at Kingston and Toronto. Through subsidiary companies we operate plants and offices in other parts of the world. Many of our operations are located in remote areas at considerable distance from metropolitan centers. The ore from which aluminum is made is called bauxite, the principal supply of which comes from British Guiana in South America, at a location about 6° from the equator, (Figure 2). Two of our other basic materials, fluorspar and cryolite, come from such distant areas as Newfoundland and Greenland.

In Canada our principal operations require the use of large quantities of electric power, and the most economical sources of power are usually found in comparatively remote locations. Thus we find ourselves conducting operations under climatic conditions which vary from the hot, humid weather of the tropics to the brisk winter weather of Northern Canada. We seem to miss the temperate climate except for our finishing plants located near the larger industrial centers.

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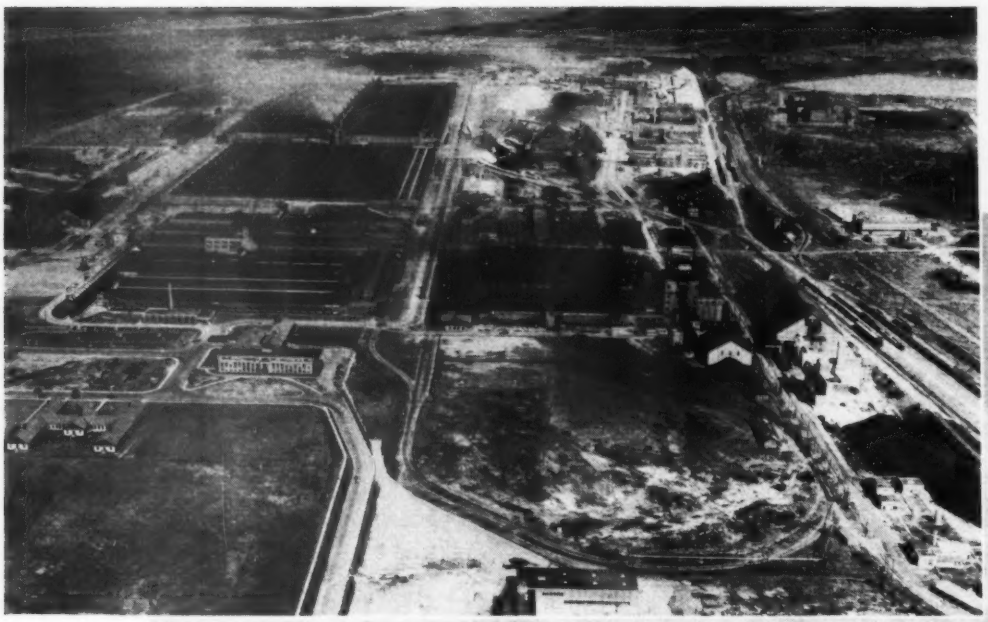

Figure 1

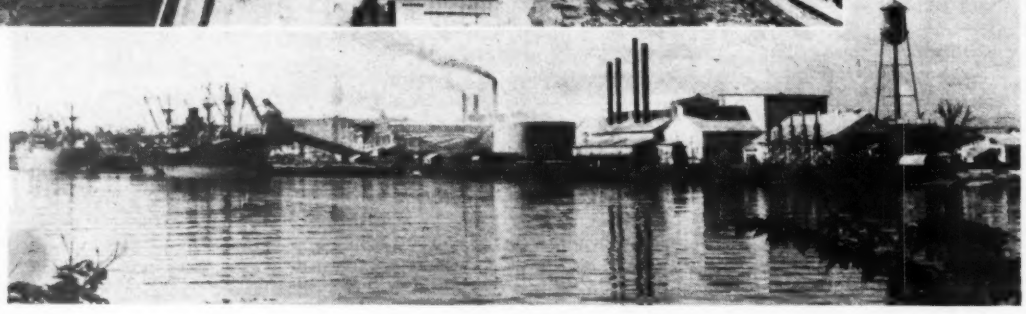

Figure 2

Our medical, nursing and First Aid facilities vary according to the nature of operations, the geographical location of the plant, the number of employees and the availability of community health facilities. As a general rule, the Company's medical services are carried out by the leading doctors of the community on a part-time basis. These local medical officers supervise, and are responsible for, all matters having to do with industrial hygiene, physical fitness of employees, First Aid services, compensation, and associated factors.

Under the general direction of our medical officers, industrial nurses operate the First Aid Stations and otherwise assist in industrial health problems. The duties of most nurses are concentrated in the operation of First Aid Stations and the assistance rendered to the medical practitioners. There is a pre-employment medical examination for each new employee at every location. Where there may be good reason to watch for symptoms of ill health or where facilities permit, we conduct periodical re-examinations including X-Ray and other special tests which may be required to guard against hazards of climate, age or exposure.

The ratio of nurses to employees varies greatly from place to place depending upon the size of the operations and the extent to which outside facilities are utilized. A ratio of one nurse for 500 to 1,000 employees is a normal range. This means the employment of from one nurse for the smaller plant to about a dozen nurses when 10,000 or more employees are involved.

At our plant at Arvida, we operate three separate First Aid Stations. The main station operates on a 24-hour basis while the branch stations are open only during regular day-time schedules. These stations receive about 200 daily visits, consisting of 40 to 50 initial calls for dressing, inspection and consultation. More serious cases are sent to nearby or distant hospitals as circumstances require.

The types of injuries dealt with are mostly contusions, abrasions, burns, blisters, and foreign bodies in eyes. We handle large amounts of hot and molten aluminum metal, as well as acids and alkalies in large quantities. Potential dangers in handling these materials are ever present and one of our most necessary duties is to keep safety practices uppermost in the minds of employees.

For the past several years we have conducted special surveys in our potrooms and other operational departments under the guidance of Dr. Brouha, a renowned international physiologist. The field work for these surveys, as well as the analysis of the data collected, has been done almost exclusively by industrial nurses. The survey requires the nurse to go into the hottest and dirtiest parts of the plant to collect the desired information. At certain intervals after tours of heavy work, the nurse takes the employee's temperature and pulse. The comparative degree of strain and rate of physical recovery is determined by the time taken for body temperature and rate of heart beat to return to normal.

It is an original piece of industrial research designed to guard the worker against excessive physical fatigue. The analysis of the data is primarily a statistical operation, and although statistics are not normally considered to be in the field of nursing, we have found that because of the nurses' intimate knowledge gained in collection of the data, they are best qualified to perform the statistical analysis.

An interesting sidelight to our investigations into industrial fatigue is the reaction it invariably creates among employees. The presence of the doctor and the nurse seems to inspire confidence and friendliness in the employee. He talks freely to them about his work problems, his worries, and many other personal matters. This all leads to improved morale and a better understanding.

When employees call at the First Aid with personal complaints and ailments unrelated to the job, the doctor or nurse on duty refers the employee to his own personal physician or civic health unit for further treatment. We are not too strict in applying this rule. Minor ailments are treated but the patient is advised to seek further medical attention elsewhere.

Absenteeism on account of sickness or for other reasons has never been a major problem in our industry. For instance, last year at our Arvida plant, where we employ over 7,000 hourly paid workers, the average of absenteeism for all causes, including sickness, for the whole year was less than 1½ days.

When Arvida was first founded in 1926, it was isolated from other communities especially during the winter, and the Company found it was necessary to establish a hospital there. Since then the Arvida Hospital has been placed in the hands of a group of citizens and it is now a public institution similar in its operation to non-industrial hospitals in other communities.

As you know, our Company is engaged in a new and very extensive program at Kitimat on the west coast of British Columbia. Some measure of the size of the undertaking can be visualized by the fact that in excess of $250,000,000 will be spent on the construction of the plant and other facilities before there can be any production. Here again, because of its remote location and the absence of any settled community in the vicinity, the Company has organized a hospital. We will continue to operate it during the construction period and the early days of plant operations. However, once the community becomes established and stable, the Kitimat hospital will be converted into a public institution and will be run by citizens of the community. Naturally the Company will continue to assist it financially but it will be managed by the people of the community.

Although we believe in the individual's responsibility for "off the job" health measures, there are occasions when circumstances justify other measures. A good example of these special circumstances is the situation in British Guiana where, through a subsidiary, we operate mines and ore plants. These operations are in an isolated area surrounded by tropical jungle, 65 miles inland from the Coast. It is accessible only by air and water.

In these operations we require about 2,000 employees but about 15,000 people reside in the area. Most of these 15,000—directly or indirectly—gain their livelihood from the mines and ore plants we operate. Education levels, agriculture, religion, general culture and the standard of living are all very different to anything we have in Canada, but are relatively high compared to any other similar location in British Guiana. There is a great mixture of races among these employees with Negroes predominating and East Indians, Chinese and Portuguese intermixed.

Public Health facilities in such remote locations are very limited, but the health of both employees and other residents in the area is vital to the success of our mining operations. Under these special circumstances the Company has "gone overboard" in providing medical and health services both "on" and "off" the job. To cope with this situation, we reverse the practice of placing responsibility for health measures on the individual and accept it ourselves—a procedure quite the opposite to the one we follow in dealing with the more fully developed conditions we have in most parts of Canada.

Under such circumstances we have established and operate a 100-bed hospital comprising male and female wards, an obstetrical ward, a children's ward, a staff wing, doctors' offices and examining rooms, dispensary, medical stores, a well-equipped laboratory, modern radiological equipment, operating rooms, nurses' quarters, and other health facilities, (Figure 3). It requires a staff of between forty and fifty people to operate the institution. Except for the doctors and possibly the head nurse, the whole staff is coloured. (Inset, Figure 3). In addition to the in-patients, some 35,000 out-patients visit this institution every year. The hospital doctors are employed by the Company. Such fees as are collected for surgical and other medical service go

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Figure 3 Hospital at Mackenzie, B. G. Insert—Hospital Staff

to the hospital rather than the doctors. Perhaps that is one reason that top surgical fees charged do not exceed $10.00 and are more apt to range between $1.00 and $3.00. For routine visits not involving hospitalization which include medical advice and First Aid, no charges are made for service. Any resident in the district is welcome regardless of any connection with the company.

For local residents the hospital charges, including board, are set at 30c. a day. For the white staff the charges are set at $2.50 a day. In setting these rates the desire is to encourage people to seek and obtain proper medical and hospital treatment in order to secure an improvement in the general health standard of the entire region.

Malaria control measures have been established over a large area. This includes spraying of ponds and stagnant pools, spraying of houses with D.D.T. etc. As a result, the incidence of malaria is no longer a major factor in that particular area; in fact it is almost entirely eliminated. Other diseases particularly prevalent in the tropics are tackled in similar fashion.

There is no doubt that these services have been responsible for a very general improvement in health standards but there is little evidence that the individuals benefiting therefrom appreciate what is being done. In fact, I have observed just the opposite attitude. This point can perhaps be best illustrated by citing a grievance registered by the natives alleging that they did not get proper attention at childbirth because delivery charges for them were set at only $1.00 while white staff had to pay $10.00. This is a case of an actual grievance registered by the union in all seriousness on behalf of the native people.

It is not the wish of our Company to be in the hospital business or in the medical profession. However, we do require the services of healthy and able employees. Towards this end we take cognizance of the local medical care situation in each individual area where we operate. Where possible we prefer to use existing facilities to the greatest degree and, where existing facilities are inadequate, we encourage their growth and improvement to the point where they can handle independently the medical problems of our employees without help from the Company. Our employees are encouraged to make use of established medical facilities. We believe that in the final analysis our employees prefer it that way and that it is better for all of us to be somewhat independent.

Both industry and the medical profession are increasingly aware of how the job may bear on the employee's state of physical and emotional health; and how, in turn, the employee's health may bear on his successful performance of his job. For this reason, we are increasingly anxious to have those medical and nursing personnel who serve our employees become more familiar with the conditions in which the employee works and with the demands of each job. In our estimation this becomes a responsibility of these professions if they wish to operate at their highest level. I would encourage all industrial nurses to make opportunities for themselves to thus increase their training and value.

In closing I would like to leave this thought with you—Canada is becoming more and more industrial in nature. More and more Canadians receive their income either directly or indirectly from industry. The Aluminum Company of Canada, like other industrial concerns, has its own operational, technical and financial problems. Industry should not assume personal, family and community health problems but, as industry expands, the more opportunity there will be for higher health standards both in and out of industry.

This all means that an ever-increasing sphere of activity is being opened for industrial and community nurses. With the maintenance of the high ethical standards on which your profession is founded and with the devotion to duty for which you are well known, you are in a position to give, over the future years, even more valuable service than you have given in the past to employers, employees and to society in general.

Nursing in Occupational Health*

Bernardine E. Striegel.
Nursing Consultant in Occupational and Public Health with the Metropolitan Life Insurance Company in New York City.

The industrial nurse who recognizes and takes advantage of her many opportunities to contribute to her profession and to the health needs of the individual industrial worker may find that she has one of the most satisfying jobs in nursing.

As we look at a well-designed plant or office building, at a delicate instrument, or a huge machine, and as we read and think about production, sales records, and the tremendous sources and potentialities of energy and power, isn't it thrilling and a bit comforting to realize that the individual employee is the most important component in this whole picture? Human beings—like you and me—plan, produce, and operate these wonders and keep them functioning.

As we look a bit closer, isn't it satisfying to know that everyone in the nursing profession, and particularly each of us in the industrial branch of nursing, plays a vital part in promoting and maintaining the physical and mental health and, therefore, the effectiveness of this most important component of industry—the individual worker?

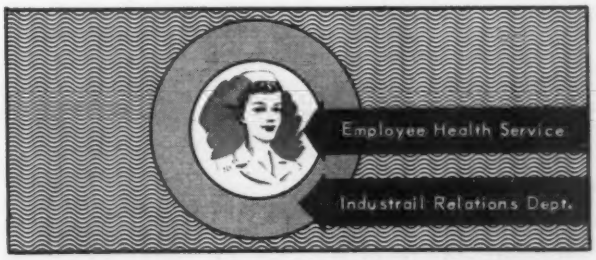
Service Requires Working With Others

No matter how vital our role, however, it is still only a part of the whole picture. Consequently, it is important for us to understand the relationship of our work to the total nursing profession and to the whole range of services which comprise an adequate health program for the individual. Actually, to paraphrase Gertrude Stein, we are "a team, within a team, within a team, within a team," in both areas. An expanding diagram may help to clarify this statement.

First we shall use a small circle to indicate the employee health service where the industrial nurse's professional knowledge and skills are utilized directly. She may be the only professional nurse in the service and have only a trained first-aid worker as an assistant, or she may be a staff nurse working under the direction of a nursing supervisor. In either instance, of course, she should have medical direction from a part-time or full-time physician.

Ideally, the worker is placed in a job which fully utilizes, but does not overtax, his capabilities. His health and work performance are evaluated periodically through physical examinations and in relation to the physical demands of his job. When he has an occupational disease or injury, he has prompt and adequate attention and rehabilitation services if they are indicated. When he has a non-occupational disability, such as a gastrointestinal upset or a cold, he has emergency care at the plant and is referred to his family physician, if necessary. These and other activities, such as health counselling and health education, are provided not only to maintain but also to improve the worker's health and his working environment.

The employee health service, however, usually is considered as only one part of the company's total services to its employees; all of these together are



frequently called the industrial relations department. Other services in this department include safety, employment, recreation, inplant feeding, and employee benefits. The second area in our expanding diagram, therefore, represents the industrial relations department, of which the employee health service is an important part.

Although these employee services may be very comprehensive, they cannot and should not meet all

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of the worker's health and welfare needs. He usually has non-occupational injuries and illnesses; he spends by far the greater part of his time off the job; and often he has a family. Many of these non-occupational health and welfare needs are met by such individuals and organizations in the community as private physicians, hospitals, public health nursing organizations, health departments, clinics, X-ray service programs, recreational facilities, and churches.

Actually, the worker and his family are the community. Consequently, an effective industrial relations department works with, and sometimes through, these individuals and organizations in the community, and recommends them to the worker and his family. For

these reasons, we shall add a third area to our diagram to represent community health and welfare agencies, and, again, the place of the employee health service in this team relationship.

As we look a bit further, we realize that individuals and organizations in the community may have state, national, and even international ties. In fact, there are some occupational health services which function only on a state or national level, such as state bureaus of industrial hygiene and the United States Public Health Service. This gives us the fourth team relationship—

state and national organizations—which is represented by a fourth area on the diagram.

Thus, we can see that the individual industrial nurse is a part not only of her company's employee health service, but also of the plant's total service program, of related community activities, and of state and national health and welfare organizations. This interdependence is highly desirable and very necessary to permit the nurse to make her most significant and satisfying contribution to the individual worker's mental and physical health.

Interaction With Other Nurses

An expanding diagram of concentric circles can be used in the same way to show our relationships within the profession of nursing.

Following the same reasoning, we see ourselves first as graduate professional nurses registered in the state in which we practice; then as nurses in the field of industrial nursing; next as associates of nurses in other branches of nursing—institutional, private duty, public health, and education; and finally, as members of a team which includes representatives of allied professions, such as medicine, social work, and engineering. Here, too, there is an interdependence which is mutually necessary and helpful.

With this understanding of relationships, it seems to me that an industrial nurse first should accept her responsibilities as a member of the team which serves the workers in the company which employs her and as a member of the industrial nursing group in the nursing profession. Her second challenge is to co-operate with other individuals, departments, agencies, and organizations in such a way that all services and programs will dovetail rather than overlap, or leave gaps, or even counteract each other.

Such teamwork, co-operation, and integration of services do not just happen. They are the result of careful planning, evaluation, and follow-through.

Self-Evaluation Helps Progress

In evaluating her abilities as an individual and as a member of a team, an industrial nurse might find it helpful to compile a questionnaire and then try to use it objectively to improve her own performance. Here are some of the questions that might be included:

Professional—These questions refer to the nurses' professional abilities, activities and responsibilities.

1. Is occupational health nursing the area in which I can make my best professional contribution, and do I have the personal qualifications for this type of nursing?

2. Do I have the education and experience that I need to practice in this specialty?

3. Do I recognize industrial nursing as a vital branch of professional nursing, and do I work individu-

ally and with others to make certain that it is maintained as a specialty and yet integrated in and understood by all branches of nursing? Conversely, do I work individually and with others to assure that industrial nurses understand and appreciate the contributions to the profession that nurses in other fields are making, and do I try to promote co-operative relationships among the various groups?

4. Do I belong to the district, state, and national nursing organizations, and do I attend their meetings?

5. Do I attend institutes and workshops and make my interests and needs known to those who conduct them? Do I assist in planning and presenting them?

6. Do I subscribe to and read professional magazines, and do I submit articles now and then for publication in them.

Services—These questions refer to practices and needs related to the services that industrial nurses provide.

1. Is our employee health service under the medical direction of a physician who visits the plant regularly, who participates in planning the total program, and who writes and signs standing orders?

2. Does the doctor or nurse in charge of this service have direct access to top management for administrative direction?

3. Is there a manual which includes procedures and job descriptions for the staff in the employee health service?

4. Is there an established procedure for orienting members of the employee health service staff to the plant and for keeping them informed about new processes, materials, employee benefits, and agreements?

5. Does our program meet the health needs of the employees? Is a conscious effort made to recognize and meet new needs or to change emphases in the existing program? For instance, is the increasing need for preventive services, such as health counselling and health education, recognized?

6. In planning the employee health service program, did we consider the help that individuals and organizations in the community could offer us, and did we make plans and establish procedures to promote co-operative relationships with them?

7. Do I interpret my program to management through individual conferences, department head meetings, and written reports which include statistics, human interest items, impressions of trends, and specific recommendations for improvement?

8. Do I utilize my many opportunities to explain the employee health services to the employee?

9. Do I work co-operatively with others in the company, particularly with those responsible for other employee services?

10. Do I know what the community's health and welfare agencies are, including hospitals, and do these agencies know about the programs that we have for our employees? Do I have a list of these organizations and descriptions of their programs, the geographical areas that they serve, their telephone numbers, the hours for appointment with patients, and the names of the staff members with whom I should work? Do I recommend these facilities to the employee or his family, and, when an employee uses them, do I keep in touch with the professional staff of the organizations so I know how he is getting along?

11. Do I know the private physicians in the community, and do I keep in touch with them when they are taking care of an employee over a period of time?

12. Do I participate in community campaigns and other activities, particularly those concerned with health, welfare, civil defence, and safety?

13. Is industrial nursing represented in the council of social agencies, or in the community health council? If there is an industrial nurse in the council, is she selected by the local industrial nursing organization?

14. Do I use consultant services that are available through official and nonofficial organizations?

Probably no two of us would have the same answers to these and other similar questions, but that is not important. What is important, however, is that we answer these questions candidly and thoughtfully, evaluate our performance, and then plan to improve it. To the degree that we follow through with our plans we will have personal satisfaction; we will enrich our total profession and our nursing specialty; and we will strengthen our own service and the services of other individuals and organizations with whom we work.

What is most important is that we shall be utilizing and integrating all of our energies, thereby promoting and maintaining the well-being and effectiveness of the individual worker. He is the primary concern of our service and of our profession; he deserves the best that we can give individually and in co-operation with others. He remains the most important component in the total situation.

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INSTITUTE of MINING HYGIENE

Condensed from material supplied by
Professor A. Houberechts,
Director, Institute of Mining Hygiene, Hasselt, Belgium.

The Belgian Institute of Mining Hygiene was founded in 1944, at Hasselt, Belgium, by the five Coal-Mining Associations whose offices are in Mons, La Louvière, Charleroi, Liège and Hasselt.(title photo).

The Institute was organized for the purpose of investigating all matters relating to coal-mining hygiene, and developing and co-ordinating the work previously done in this field by the "Federation of Belgian Coal-Mining Associations," and the various collieries throughout Belgium.

The Board of Directors of the Institute comprises ten members elected by a committee made up of two associates from each of the five coal basins.

Operating expenses are taken care of by annual contributions from each coal basin, the amount depending on the net coal production of the affiliated collieries for the year.

The internal organization of the Institute is basically divided into three units, a medical section, a technical section and an administrative section. A director is in charge of all operations, and he is assisted by medical and technical advisory committees whose members are chosen from universities, the Mine management and various coal-basins.

Results of studies carried out by the medical and technical sections are made known to the affiliated collieries through original bulletins, called "Communications," and information derived from literature is distributed in the form of "Bulletins of Medical (Technical) Information." These publications are also exchanged with research centres in other countries where similar work is being carried on.

The Medical Section

The staff of this section consists of a head doctor, a radiologist, a physician specializing in cardiopulmonary physiopathology, and voluntary physicians, assisted by nurses and laboratory technicians.

The primary concern of the Medical Section is the study of diseases among people living or working in dusty environments. Pulmonary diseases caused by inhalation of dusts are grouped under the heading of pneumoconiosis, and they include silicosis, siderosis, asbestosis, and anthraco-silicosis, the name used referring to the noxious constituent of the air responsible for the disease.

For radiographic exploration, the Medical Section of the Institute is equipped with a *radioscopic installation* and a *powerful X-ray apparatus* with a *rotary anode*, which permits lung radiographs to be taken at a distance of over two yards with an extremely short exposure. In order to overcome difficulties encountered with the reading of ordinary static X-ray photographs, *a tomograph* was installed. The tomograph is a device which makes it possible to take an X-ray photograph of the lung layer by layer and so isolate the various opacities and locate them in depth.

Tomography has numerous medical applications but its most important use in the Institute program is the detection of tuberculous cavities which may be concealed on the usual film either by a pleural thickening or by massive shadows. It also permits differentiation between massive shadow and pleural thickening, and tuberculous cavities and emphysematous blebs; thus the physician is able to make a thorough study of pneumoconiotic pictures.

In order to obtain information on the general health conditions of miners in their work environments, ***extensive surveys*** of the various coal-mining centres were

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carried out. For this purpose, *a mobile X-ray unit* was purchased, which provides facilities for taking both small (10x12.5CM) and large size radiographs. In addition to X-ray equipment, this unit includes three undressing cubicles, and a dark-room, equipped with water storage, developing baths and a pulsed air dryer. X-ray examinations are supplemented by clinical, haematological, spirometric and electrocardiographic examination. Periodic investigations of this type reveal interesting data on the development of pneumoconiotic conditions and allow reallocation of personnel before permanent damage is sustained.

Since 1951, a new laboratory has been built for the purpose of conducting special tests on pulmonary functioning. This laboratory is equipped with special apparatus which facilitates such investigations. This equipment includes:

(a) A *Spirometer* which records the respiratory curve from which may be derived the measurement of current volume and expiratory and inspiratory volumes.

(b) *Douglas flasks* for collection of expired air of the patient at rest which permits determination of maximum aeration per minute and ventilation during exertion, both measurements being in liters of air. (Figure 4).

(c) *A moving carpet* at a 14° slope on which the patient walks in order that tests may be carried out during exertion.

(d) *Scholander devices* (gas micro-analysers) which measure the percentage of oxygen, carbon dioxide and residue (mostly nitrogen) in the air samples collected in the Douglas flasks.

(e) *Beckman oxymeter* for determination of the partial pressure of oxygen in collected air samples.

(f) Apparatus for determination of degree of oxygen saturation of arterial blood. Formerly this measurement was made by the *Van Slyke apparatus* requiring samples of blood for analysis, but this method has been succeeded by *the direct reading oxymeter* employing the principle of analysis by *spectrometry*, and this permits readings to be taken not only while the patient is at rest, but also while he is performing definite work.

(g) The ergometric *bicycle of Fleisch,* for measuring exertion of pedalling. Oxygen consumption is measured by a *Tissot gasometer.*

(h) *A double bell-spirometer* (Pulmotest) to assist in determination of emphysematous complications of the lung, and the origin and cause of dyspnoea. *A Noyons diaferometer* is also employed in this procedure. (Figure 1).

(i) An automatic *"Iontomat"* regulator of time exposure for X-rays, which allows for production of films which are comparable in all respects.

(j) A *Pantix Strator* apparatus which makes axial tomographic sections possible. In this method, the X-rays remain static and the patient and film are rotated around parallel axes.

Since 1947, the Medical Section has carried out considerable clinical, radiographic, electrocardiographic and anatomo-pathological research on the cardiovascular effects of silicosis, and precise criteria for early diagnosis of cardiac involvement in pneumoconiosis have been defined. Various other investigations have also been conducted on the hematological and humoral aspects of super-imposed secondary infection, such as tuberculosis, in the evolution of pneumoconiosis.

Prophylaxis and treatment of anthraco-silicosis is another function of the Medical Section. In connection with this, studies of alumino-prophylaxis and alumino-therapy have been carried out and tests involving the use of pneumodilating aerosols in the prevention of pneumoconiosis have been conducted.

Where possible, background information is derived from anatomo-pathological documents available.

In the study of pneumoconiotic lesions, sections of lung tissue are cut by microtome and prepared for examination by a special technique. This allows for more detailed analysis of lung changes.

Other functions of the Medical Section include co-operation with universities in experiment on dust contamination and aerosol prevention studies of occupational diseases other than pneumoconiosis, general hygiene of underground workings, and dietary and personal hygiene habits of miners. Recent projects have been an investigation of the incidence of syphilis among foreign miners in one of the coal-basins, and a study of labour at high temperatures to determine safety margins to be used in the training of rescue workers.

In addition to its other functions, the Medical Section acts as a co-ordinating unit between the coal-mine physicians and the recruiting doctors in the various coal basins. The latter are invited to staff meeting where they are informed about recruiting procedures, radiographic classifications to be adopted, and standardized methods of obtaining case histories of miners.

Technical Section

At present, the Technical Section of the Institute has a permanent staff consisting of a chief engineer, a mining engineer, a bachelor of chemical sciences, a technical draftsman and a laboratory assistant. This staff is occasionally supplemented by engineers who wish to become familiar with the procedure of measurement and control, and by colliery personnel when tests are being made underground.

The Technical Section is faced with two major problems, dust control and the study of high temperatures and aid-conditioning in mines. For this purpose, the Institute is equipped with a variety of instruments and devices designed to give qualitative and quantitative measurements of atmospheric dust content.

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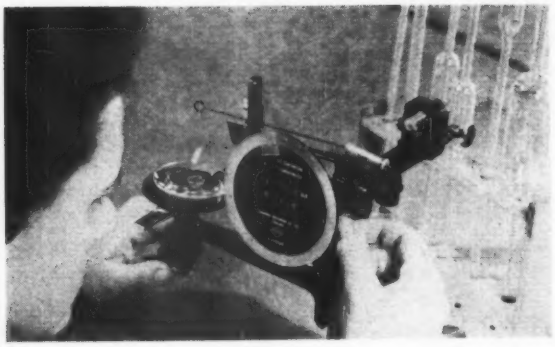

Figure 1

Dust samples are collected by a *Soxhlet filter*, employing a gravimetric method. This method yields very accurate results and makes it possible to take samples large enough for chemical and mineralogical analysis. Since filtration alone provides little information on granulometry of collected particles, other sampling devices are systematically used to examine the concentration of particles in the air and to determine their granulometric spectrum.

Apparatus for these operations includes a *midget impinger* which collects dust from the air in distilled water or alcohol, the *thermal precipitator* which precipitates dust particles on glass slides by heat radiation, and *the konimeter* and *jet-dust counter* which employ the principle of imparting sufficient kinetic energy to the dust particles to make them adhere to the glass slide.

At present all dust samples are examined at a magnification which permits detection of particles as small as 0.2 microns. The *phase contrast* technique is used in the examination of transparent dusts.

Figure 2

Weighing and counting of atmospheric dusts are done in conjunction with *physical and chemical examinations* to indicate the amount of silica present.

This procedure will soon be augmented by *differential thermal analysis* involving the principle of heat liberation during crystalline transformation of quartz.

These techniques make possible the study of *dust control* in the field and in the laboratory. The efficiency of several "dust-laying" methods and means of eliminating dust at the source have been studied. (Figure 2).

For instance, it has been found that certain simple alterations with the pick will reduce the raising of dust; and more than 70 types of water spray devices have been tested to determine the most efficient types for settling dust with the use of a minimum amountof water.

In the matter of personal protection, *respirators* are tested in a dust chamber to determine their practical value to workmen in dusty environments.

The other aspect of mining hygiene which has received considerable attention is *the control of high temperatures*. Studies have been carried out to determine climatic limits within which an individual may continue to work efficiently without harm to his health. These studies involve the use of thermometers, pyrometers, barometers and psychrometers. This research has resulted in the promotion of certain efficient means of preventing the overheating of air before it reaches working levels.

The question of proper *ventilation* has been subjected to extensive study and various methods of air-conditioning including refrigeration in areas where high temperature and humidity cannot otherwise be controlled, have been adopted.

Studies on lighting have also been carried out by the Technical Section in co-operation with the Committee on Mine Lighting of the Belgian National Committee on Mine Lighting. These studies were concerned with visibility and optimal lighting in underground work.

Sanitation is an important factor in underground working, and the technical facilities at the institute and in the collieries are daily endeavouring to improve the sanitary conditions in mines.

On an international basis, the Institute of Mining Hygiene has established relationships with scientists of many countries who are interested in similar problems; physicians and engineers of the Institute participate in international conventions and conferences devoted to occupational health and mining hygiene literature is exchanged with interested groups in other countries. In this way, the Institute is able to make its contribution to international scientific co-operation which is so important for the solution of difficult but socially important problems such as those which motivated the creation of the Institute. This type of scientific co-operation has facilitated the collection of important information and has avoided duplication of effort. It has also made possible the interchange of ideas on the various aspects of the work carried on by the Institute and thus given it the benefit of the experience of other persons interested in the subject.

The work of the Institute through its widely differing aspects is involved with one great collective undertaking, namely the improvement of the health and working conditions of coal miners whose work has such an important influence on the economy of the country.

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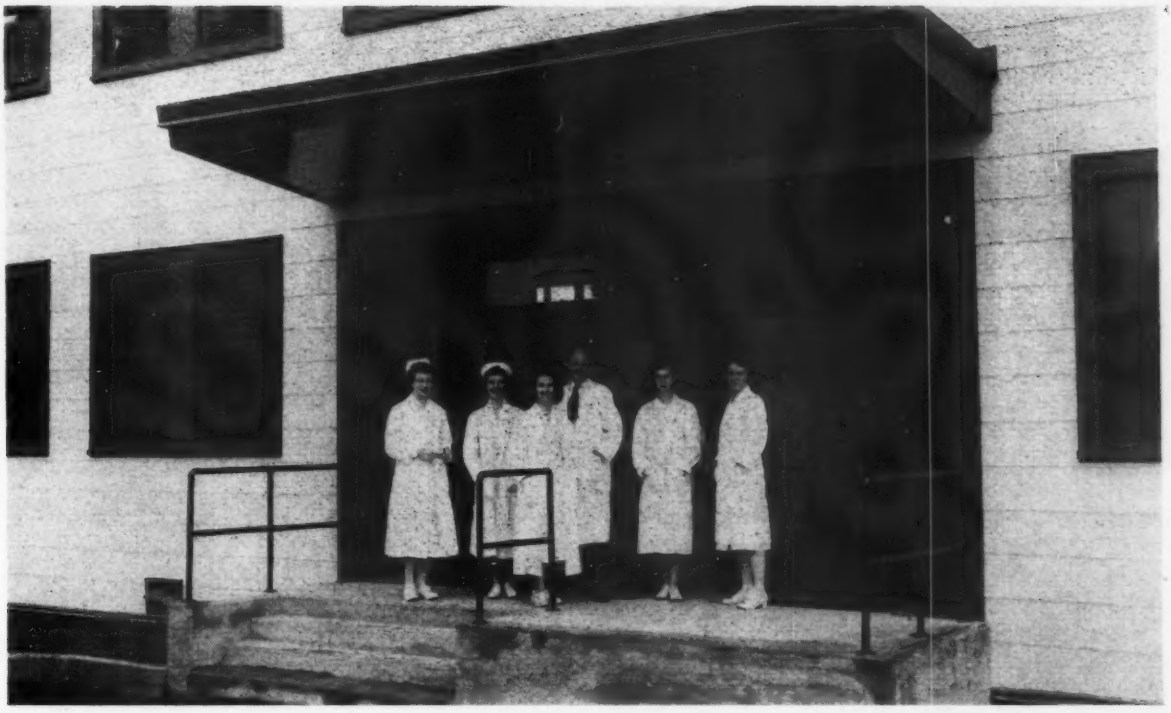

A UNIQUE DECONTAMINATION CENTRE

E. M. Renton, M.D.,
Chalk River Project,
Atomic Energy of Canada, Limited.

Atomic energy has revolutionized many phases of present day living and promises to bring forth even greater changes in the years to come. The harnessing and utilizing of atomic energy for humanitarian purposes has probably been the greatest boon to mankind in history: X-ray has made it possible to study the internal structure and functioning of the human body; radium and cobalt sources have been used to good advantage in the treatment of cancer; radioactive substances have been used to locate sources of diseases and other body abnormalities; in fact, there is ever-increasing use of radioactivity in almost all spheres of human activity.

However, despite all the advantages accruing from the introduction of atomic energy, there is the ever-present hazard of injury to personnel from radiation, and this may vary from a mild disorder to major incapacity and possibly death, if proper precautions are not taken to avoid radiation. This article deals with another problem encountered at the Chalk River Atomic Energy Project where radioactive substances are handled extensively, and despite all protective measures used, there is the possibility of the skin becoming contaminated by these radioactive substances. If immediate steps are taken to decontaminate the skin, the possibility of absorption into the system is greatly reduced.

The new Plant Hospital, described in the March 1954, issue of the Occupational Health Review, Volume 5, No. 2, has an adjoining, but self-contained, decontamination unit, which, as far as we know, is the first such unit designed to deal with the problem of skin contamination of workers using radioactive material. This unit, which was the result of careful and organized planning, was designed to cope with several types of contamination problems which had occurred during the operation of the project, namely,

(1) Simple skin contamination of the hands, face and hair.

(2) Simple contamination with an accompanying wound.

(3) More generalized body contamination.

(4) Generalized body contamination with accompanying injury or wound.

(5) Decontamination of the body of a fatally injured worker.

Figure 1 is a plan of the Decontamination Unit with indication of treatment flow within the unit.

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Design Layout of the Decontamination Unit.

The Decontamination Unit has its own separate entrance from the outside (Title figure) which eliminates the possibility of contamination of the Health Centre proper. Immediately inside the entrance, there is a hand and foot monitor (1)* where strecher bearers and other attendants who are not accompanying the patient beyond this point may check their hands and shoes for activity (Figure 2). Also in this area is a foot-operated sink (9) where contaminated attendants may scrub-up before proceeding out of the Unit. Just beyond the barrier between the entrance and the main part of the Unit is a self-contained supply room (11) stocked with instruments, drugs, other medical supplies, and special clothing and equipment necessary for decontamination procedures. This room has a dispensing window at either end to facilitate the distribution of supplies to attending personnel. The supply room is at all times kept stocked with sufficient supplies to deal with emergencies without having to draw on the stores of the Plant Hospital and in this way all contamination will be confined to the Decontamination Unit.

In the approximate centre of the area, there is a scrub-up unit (6) and two shower units in which ambulatory cases, with or without accompanying wounds, may be decontaminated and dressings applied, if necessary (Figure 3). There are two portable radiation detectors (2) in this section which indicate the presence and the degree of radioactivity associated with the contamination.

For decontamination of non-ambulatory contaminated personnel, the Centre is equipped with a shallow porcelain tub (7) actually an autopsy table, which lends itself to easy decontamination and allows for easier transfer of the patient from stretcher to tub than would be possible with a standard bathtub. (Figure 4).

As may be observed from the plan, the area marked "Contamination 2" is designed for more definitive treatment of contaminated personnel and is equipped with emergency beds (Figure 5).

Construction Features

Floors:—The flooring throughout is linoleum which may be easily and economically replaced if it becomes contaminated.

Windows:—There are adequate windows, as indicated in the diagram and these provide plenty of daylight for examination purposes.

Barriers:—There are barriers (4) located between the different sections of the Centre and these barriers, designed as simple lift-up gates, are intended to prevent the carry-over of contamination from one area to another. (Figure 6).

*Single figures in parenthesis refer to numbers on floor plan (Fig.1)

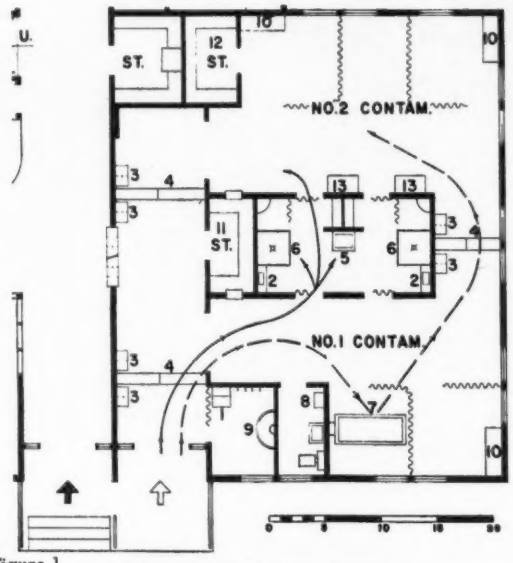

Figure 1

DECONTAMINATION UNIT LEGEND

1. HAND AND FOOT MONITORS
2. PORTABLE MONITORS
3. RUBBER STATIONS
4. HINGED BARRIERS
5. SCRUB-UP SINK WITH SHAMPOO ATTACHMENT
6. SHOWER UNIT
7. SHALLOW BATH
8. LAVATORY WITH BEDPAN STERILIZER
9. FOOT-OPERATED SINK
10. COUNTER AND CUPBOARD
11. EMERGENCY SUPPLIES -INSTRUMENTS, DRUGS, ETC.
12. RESERVE MEDICAL SUPPLIES
13. CLOTHING STORES

Figure 2

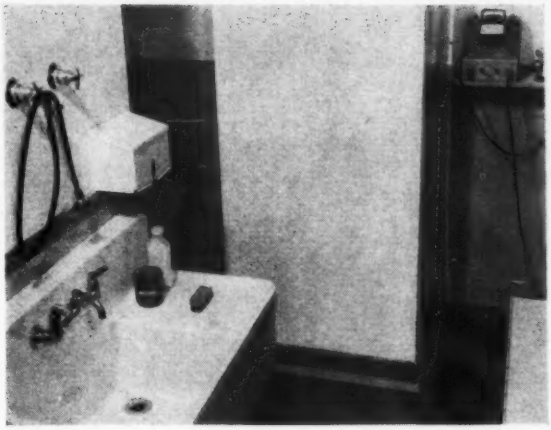

Figure 3

Bathroom:—In order to make the Unit as self-contained as possible, a small bathroom (8), containing a bed-pan sterilizer in addition to the standard fixtures, was included.

Protective Equipment

Staff Clothing:—Attending medical staff from the Plant Hospital have their own personal protective clothing and footwear stored at, or near, their place of work, and in the event of an emergency involving contamination, they put on this clothing at the barrier between the Hospital and the Decontamination Unit (Figure 6). This clothing consists of plastic aprons, laboratory coats, gloves and rubbers. There are supplies of clean protective clothing at each barrier so that persons moving from a contaminated to a non-contaminated area in the unit may change into clean clothing.

In the shower area (6), there are cupboards (13) containing clean garments for workers whose own clothing has become contaminated. These stocks are kept replenished and are sufficient to accommodate twenty-four patients at any one time.

To prevent unnecessary contamination, especially during treatment of stretcher cases, heavy paper, which is kept on hand in the supply room, is spread over the floor.

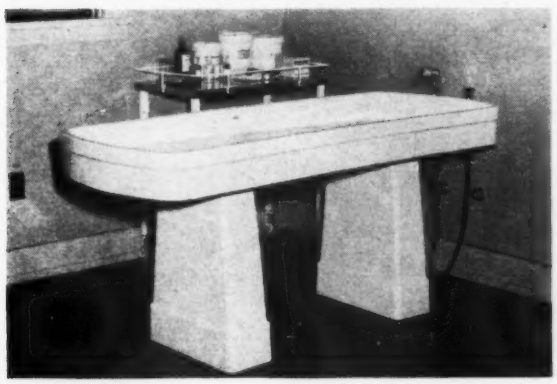

Figure 4

At various points in the Unit, there are large portable hampers with paper reliners which can be discarded when contaminated.

Mattresses and pillows on emergency cots in "Contamination 2" are fitted with plastic covers which protect them from contamination.

Decontamination Procedures

At the Place of Work:—Whenever a worker's skin becomes contaminated, initial washing or showering is carried out at, or near, the place of work. This phase of decontamination is supervised by the Radiation Hazards Surveyor. Should skin contamination persist after conservative cleansing with soap and water, the contaminated worker is referred to the Decontamination Unit for further action. This procedure was designed to discourage the indiscriminate use of chemical decontaminants by the workers themselves.

In the Decontamination Centre:—The contaminated worker will walk or be carried through the entrance of the Decontamination Unit. After accompanying personnel or stretcher bearers have turned the patient over to the attending medical staff, they will check their hands and feet for contamination at the hand and foot monitor, and if they are not contaminated, they will leave the building immediately. If there is contamination present, they will wash thoroughly with soap and water at the foot-operated sink before leaving the building. They should check at the monitor again after washing to be sure that the contamination is below the danger limit. If they are unable to remove the contamination by this method, they should be decontaminated in the Unit by the medical staff.

(a) *The Ambulatory Patient:* After being taken in charge by the medical staff, the ambulatory patient is taken into the scrub-up section (6), monitored by the portable Geiger Counters (2), and decontaminated. After decontamination, he has a thorough shower, any wounds are dressed and after donning fresh clothing, he returns to work, or home, whichever is recommended by the Medical Officer.

(b) *The Non-Ambulatory Patient:* The non-ambulatory patient, after arrival at the Centre, is transferred from the stretcher to one of the Centre's mobile stretchers by the medical staff, and taken into "Contamination 1".

Patient's Clothing: Here his contaminated clothing is removed and he is placed on the autopsy table (7) and gross decontamination, as well as emergency and supportive treatment, is carried out. After this procedure, he is transferred to "Contamination 2," where more detailed and thorough treatments are instituted. Following this he is removed to a general hospital, or his home, according to the discretion of the medical officer.

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In the event of an emergency, two men from the Health Radiation Section of the plant are assigned to the Decontamination Unit in order to assist the medical staff.

Records

A Special Decontamination Record is completed for all cases and the actual sites of contamination, showing initial, intermediate and final radiation counts, are graphically represented on a human body silhouette on the reverse side of the form. The method of decontamination used is also entered on this form. This record form is attached to the patient's hospital records.

In all cases, workers who have been contaminated are requested to bring in an overnight urine sample, and a follow-up is carried out if analysis of the sample so indicates.

Discussion

Although this unit was primarily designed as a decontamination centre, the layout and allocation of supplies is sufficiently flexible to cope with other medical emergencies where contamination is not involved.

The chief purpose of the Unit is to function as a casualty clearing station where initial decontamination and emergency treatment can be carried out prior to transferring the patient to a general hospital. This decontamination procedure will eliminate, or at least minimize, contamination of the hospital concerned.

In the event of a fatal accident involving external contamination of the body, preliminary decontamination, and, if necessary, embalming can be carried out in this Unit prior to releasing the body to a mortician.

Summary and Conclusion

In a situation such as exists in the Chalk River Atomic Energy Project, it is essential to have some means of dealing with skin contamination of personnel. Our Decontamination Centre was not the result of a sudden idea, but rather was based on our own past experience in dealing with such cases, and even though it may lack some essential features, it has proven to be well worth the expenditure of time and money. As an original experiment, we are justly proud of our Decontamination Centre, and we feel that it is a good pattern for others to follow.

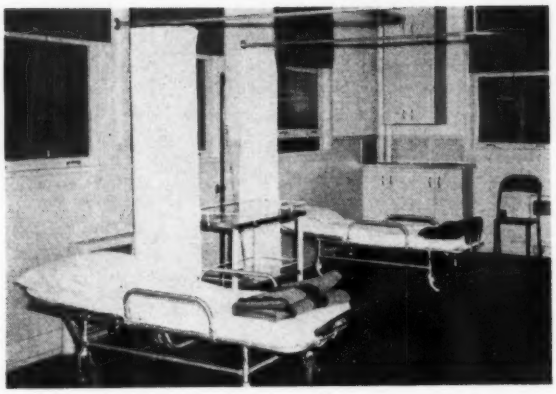

Figure 5

EDITOR'S NOTE:

Through an oversight, the following acknowledgements were omitted from the article "Industrial Health Centre in an Atomic Energy Project" published in the March 1954 issue of the *Review*.

"The major part of the design of these facilities was carried out by Dr. E. M. Renton, who is in charge of the Plant Hospital Branch of the Medical Division.

It is a pleasure also to acknowledge the contributions of the Architectural, Civil and Mechanical Branch of the Engineering Division".

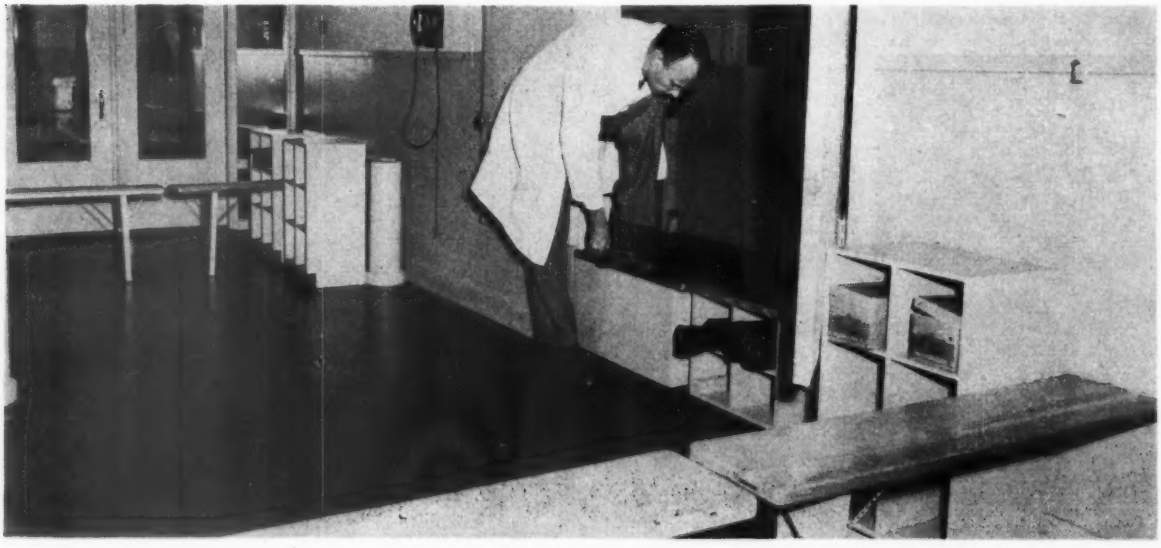

Figure 6

Health Services

IN INDUSTRIAL CIVIL DEFENCE

Edited by Arnold V. Raison, B.A.,
Technical Editor,
Occupational Health Division*

Civil defence is defined as the organized efforts of civilian personnel to protect the civil population from the effects of enemy attack or peacetime disaster; to minimize loss of life, injury and property damage; and to maintain production and a semblance of normality in daily living.

The introduction of civil defence programs in Canada has met with considerable resistance in some quarters, because it is difficult for anyone who has not witnessed, or been involved in, a major castastrophe, to visualize the necessity for advance preparation to deal with such situations.

Many people adopt the attitude that "it can't happen here," but they are overlooking the fact that even though we may not be the direct target of aggressive military action, our cities and towns could be bombed by long range aircraft with the purpose of interrupting production of vital materials and lowering the morale of personnel. In war-time, civil defence is as important as military defence, because the production of essential materials must be maintained at a high level, and any interference with industrial operations would be a serious blow to the overall war effort. Therefore, it is important that as much protection as possible should be provided for our industrial establishments and personnel to prevent work slow down and interruption of production routines. It is the responsibility of each industrial organization to have some plan designed to safeguard its own personnel and equipment, and to make possible resumption of production schedules with a mimimum of time loss.

Civil defence organizations should not be designed to function only in the event of war. In the past few years a number of peacetime disasters caused by floods, fires and hurricanes have resulted in widespread damage to property and loss of human lives partly because the communities and areas where they occurred were not prepared to deal with such emergencies. The inhabitants of these communities are now keenly aware of the value of organized civil defence services, and have made the necessary arrangements for future protection.

Basic Considerations in Planning

The acceptance and successful promotion of any group plan of action will be greatly influenced by the attitude of individual members of the group towards the plan. Before whole-hearted co-operation and participation can be expected, each group member must understand, and be concerned about, the problem; he must feel that it can be solved and that the method proposed is acceptable; and finally, he must feel that the problem affects him personally, and that he has a part in making the decisions for solution.

Therefore, in order to gain support for the plan, it is necessary that it be presented so that it is within the framework of the individual's understanding and experience.

Difficulties which arise during any phase of development are best resolved by group discussion, so that each member will feel that he is personally involved in the final decision. In such discussions, the ideas and opinions of the "little man" are as important as those of the

*Prepared in collaboration with members of the Occupational Health Division, and the Civil Defence Health Planning Group, Department of National Health and Welfare.

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recognized leader, because in most industrial establishments these people are presenting the views of the majority who will be involved in the procedure and unless a mutual understanding is reached with them, any plan of action will be doomed to failure.

Organization for Civil Defence

In a recent manual, the Federal Civil Defence Division has drawn up an organization chart which gives an outline of civil defence organization in industry.

Direction

Authority for the control of Civil Defence Planning, organization and operation should be vested in one individual, preferably someone from top management who is thoroughly familiar with all operations of the plant, and capable of leading and directing the individuals under his control. This person will be designated as Plant Civil Defence Director, and he will be directly responsible to the president or director of the plant or organization. In larger plants or establishments, it may be advisable for the Plant Civil Defence Director to appoint a Deputy Director to act in his absence and to assist him in Civil Defence matters.

Services

The services necessary for civil defence include warden, fire, police, health, rescue, engineering, welfare, and whatever other services are deemed necessary to suit the needs of individual industries.

Planning and Organization Committee

In order that all Civil Defence services be organized and properly co-ordinated, they should each be under the control of one individual who is best qualified for this particular position.

The persons chosen for these positions will be designated as the Civil Defence Planning Committee, and they will be directly responsible to the Plant Civil Defence Director. Each member of this committee will be responsible for the planning, organization and training of his particular service, and will assume control of operations in the event of war or peacetime disaster or emergency.

For the purpose of this article, we shall not go into detail about the other services but shall concentrate on health services. The overall picture is contained in Civil Defence Manual No. 6, "Industrial Plant Protection", which is available from Provincial Civil Defence Co-ordinators.

Health Services

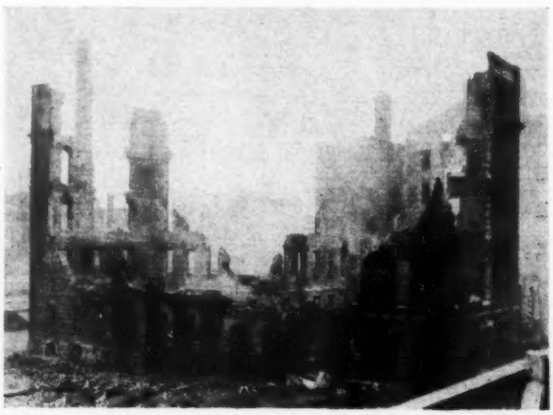
It is reasonable to assume that there will be casualties from enemy air attack, but many lives may be saved through the efforts of efficient medical and first aid services which are organized and trained to deal with

mass casualties. Teamwork is very important in such situations, and this requires that every member of the organization be fully trained, well informed, and aware of the importance of his role in the total civil defence plan. Well integrated teamwork inspires confidence among members of the team; this in turn sponsors better human relations and strengthens morale which is essential to the success of any venture. High morale and team spirit will inspire the confidence of others around you because they will realize that they can depend on the health services to provide them with competent care and treatment.

An interchange of ideas and activities with other plant and community health organizations will promote uniformity of action and co-ordination of effort. A well planned public relations program, to keep the public informed about developments within the plant and to establish friendly working relationships with other medical and allied groups in the district, is very important as a means of evaluting your service and will serve as a stimulus to others.

Direction of Health Services

In large plants and business establishments, medical and first aid services are usually under the direction of a doctor or a nurse; smaller plants which do not engage a



full-time medical or nursing staff frequently have a first aid attendant, or one or more employees especially trained in first aid who will be responsible for first aid in the plant.

For Civil Defence purposes, the doctor or nurse should logically be in charge of all health service planning within the industry. In small plants, the person responsible for the first aid program should co-operate with management and local civil defence agencies in the planning of a health program for civil defence. The person who assumes the responsibilities for Civil Defence Health Services will be designated as Plant Health Director.

The Plant Health Director will appoint:

(a) An alternate to assist with the program and be responsible for the direction of health services in the absence of the Director.

(b) Deputies to cover each working shift.

If the industry does not employ a doctor or a nurse, the individual responsible for Civil Defence Health Services planning will be guided by the duties and responsibilities outlined for the Plant Health Director.

Responsibilities

The responsibilities of the Plant Health Director will vary according to the size of plant, its location, the materials manufactured and many other factors.

(1) The Plant Health Director will advise management on the extent of the plant's Civil Defence Health Services planning. This will be determined in part by the actual plant location, that is whether it is within, on the fringe of, or at a considerable distance from, a potential target area.

(2) Health Directors of plants located in highly industrialized areas, should establish close liasion with those persons responsible for Civil Defence Health Services planning in nearby industries for the purpose of providing reciprocal aid in the event of an emergency arising from enemy action or peacetime disaster.

(3) Management must be aware of its responsibilities to employees and to the community in the case of disaster occurring during non-working hours. The Plant Health Director will cope with the medical aspects of such an emergency.

(4) Plant facilities, materials in the process of production, finished products and waste materials, all of which are under control under normal circumstances of work, should be assessed to determine whether they will constitute health hazards to employees and the community in the event of a disaster.

(5) Morbidity records maintained by plant health services should be kept up to date and checked periodically for the incidence of new disease.

(6) The Plant Health Director will establish a close liaison with the plant engineering services with regard to emergency sanitation, and heating, lighting and water supplies.

(7) It will be necessary to establish and equip first aid posts, and to organize first aid teams and stretcher teams. The Plant Health Director will make arrangements for adequate medical supplies.

(8) The Director should be thoroughly familiar with the community Civil Defence Health plans and the role of his own service in the total organization for the area.

Duties of the Plant Health Director

For Civil Defence purposes, the Plant Health Director or his alternate will be responsible for the following:

(1) Preparing an inventory of the available plant resources.

(a) Personnel

(b) Supplies

(c) Equipment

(d) Physical Resources, i.e. sources of water supplies, electricity, natural protective features of the environment, etc.

(2) Organizing first aid training for plant personnel.

(3) Organizing first aid facilities to meet disaster requirements and deciding on alternate sites for first aid posts to function in the event of damage to original locations.

(4) Arranging priority for the use of company vehicles as emergency ambulances.

(5) Knowing what supplies will be available at the time of an emergency; how and where to procure them; and conditions under which they may be drawn.

(6) Reporting state of personnel and casualties through the Plant Civil Defence Director to the local Civil Defence Health Director after disaster or enemy attack.

First Aid Stations

The First Aid Station is the basic unit in Canadian Civil Defence Health Services Planning, and therefore it is important that plants should organize the nucleus of a Civil Defence First Aid Station in their pre-disaster planning. Where it is not feasible for a small plant to organize its own First Aid Station, it should combine with nearby small plants for this purpose.

First Aid Teams

Each plant should organize First Aid teams. Such teams should be trained to appraise injuries, render first aid, complete the standard emergency medical tag, direct patients to medical care, and have some understanding of the civil defence form of triage, (whereby evacuation of casualties for medical treatment is divided into three levels of priority) to expedite early and uniform handling of the more seriously injured.

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Stretcher Teams

In larger industries with organized health services, there is usually some definite arrangement for transportation of casualties from the incident site to the Health Centre or first aid headquarters. In many large plants, stretchers are placed at various points through the work areas, and local employees, who have been trained in evacuation of casualties by stretcher, act as stretcher teams. For Civil Defence purposes it will be necessary to increase the number of stretchers and stretcher teams, and where possible, introduce a short course for stretcher teams on the basic principles of rescue. Team training and practice involving loading, carrying and unloading of a stretcher should be emphasized.

Small plants without organized medical services should make arrangement for evacuation of casualties, either within their own plant or in co-operation with the other small plants in the immediate area.

Medical Supplies

Industries are not asked to purchase large quantities of medical supplies immediately, but it has been suggested that for Civil Defence purposes 20% more than the regular quota be available in the medical department.

Training of Medical Personnel for Civil Defence

Following organization of Civil Defence health services, a programme of training should be instituted. All personnel, from the Plant Medical Director to the office clerk should be thoroughly aware of the role of the health services in industry and their personal responsibilities within the framework of their own plant health services organization.

This will require formal training and practice for optimum results, and the training should begin with the Plant Health Director.

Training of Medical Officers for Civil Defence

At present, the Federal training school for medical officers is located at Camp Borden, Ontario. A certain number of medical officers are selected to attend a course at this school where they are taught the principles of A.B.C. warfare, the handling of injuries in mass disaster situation, and various methods of organizing and teaching civil defence health services in industry.

Training of Industrial Nurses

Three years ago, an instructional team, from the Federal Department of Health and Welfare made a country-wide tour of Canada teaching the Nursing Aspects of A.B.C. Warfare. This was a three-day course, intended to prepare certain nurses to teach this course in their own province and to organize further courses. At present, six provinces have incorporated the A.B.C. Warfare course into the undergraduate nurse curriculum in hospital training. Repeat courses for graduate nurses are offered from time to time and the nurse can obtain information regarding these from the Registered Nurses' Association representative in her locality.

First Aid and Rescue Training

Training for First Aid Instruction will be provided locally by St. John Ambulance, and based on their manual. These instructors will be responsible for teaching full first aid training to medical and rescue personnel and basic first aid to all other members of the plant. This training will be based on official Civil Defence Handbooks and syllabi.

Training in Monitoring and Decontamination Procedures

Although this phase of civil defence will normally come under the control of specially trained technical personnel, it is advisable for medical officers to be able

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to decontaminate and treat personnel suffering from radiation injuries without exposing themselves unnecessarily to radiation hazards.

Morale, and Panic Control

The state of morale of personnel may be a deciding factor in the success or failure of civil defence operations, and therefore, every effort should be put forth to keep it at a high level. Morale in disaster situations will be influenced by a variety of factors including confidence in leadership, knowledge and understanding of the plant programme, relationships with other personnel, and degree of psychological conditioning through active training participation. Lack of knowledge and fear of the unknown are conducive to panic which is capable of completely demoralizing personnel under stress.

The following are a few suggestions for reducing fear and panic and improving morale before, during and after disaster.

1. Acquaint all personnel with the effects of atomic weapons, and above all, be factual—do not over-estimate or under-estimate the dangers associated with them.

2. Be sure that all medical personnel are thoroughly familiar with the organization of the health services for civil defence, and impress them with the fact that no matter how insignificant their job may seem it is very important in the overall effort.

3. Stress group activity! United effort tends to improve morale and prevent panic.

4. Keep all members of the medical team informed about programme developments and changes.

5. Accentuate the positive! Emphasize the number who will escape injury, rather than the number who may be killed.

6. Encourage personnel to discuss their fears of atomic attack! Although this may depress them at first, they will soon realize that their fears are shared by other members. This helps to develop a group spirit which will be very helpful during attack.

7. Carry out practice drills in first aid and emergency care until each member of the team can perform his task almost instinctively.

8. Accustom personnel to the sight of mutilated, dismembered, bleeding and dying bodies, through the media of movies, realistic practice drills using casualty "make-up," actual photographs, or real instances where possible.

9. Do not burden any one individual with too many duties, and do not allow civil defence training to interfere unduly with routine daily work.

10. Integrate your plans with the community plan for disaster.

11. Work with confidence, courage and a good sense of humour.

12. Keep employees busy even though the job you give them is not vitally important. If the individual is occupied he will have little time to worry.

13. After disaster, persons will be worried about the welfare of their families and friends. Every effort should be made to secure this information as soon as possible and to assure them that definite arrangements are made for care of such eventualities through local health and welfare groups.

Conclusion

Organization of Civil Defence Health Services will vary from industry to industry, and will need to be fashioned to cope with specific situations.

The material here presented is intended as a basic guide to organization of health services for civil defence, and should not be interpreted as a rigid, inflexible pattern. Further information may be derived from municipal, provincial and federal civil defence authorities, and from the manuals and other publications listed below, which may be obtained from provincial Civil Defence Co-ordinators, or from the Queen's Printer, Ottawa, Ontario:

1. Industrial Plant Protection —Civil Defence Manual No. 6
2. Basic First Aid —Civil Defence Manual No. 5
3. First Aid and Home Nursing Supplement —Civil Defence Manual No. 10
4. Operations and the Control of Civil Defence Services —Civil Defence Manual No. 13
5. Hospital Services and Casualty Records —Civil Defence Manual No. 12
6. Emergency First Aid—A recent pamphlet published for Civil Defence.

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